CHAPTER 3. PROBLEMS AND OPPORTUNITIES

The definition of water resources problems and opportunities provides a framework for plan formulation and helps establish a set of objectives that a project would attempt to meet. Water resources problems are related to changing water needs, hydrologic variations in water availability, and the limited ability of current facilities to store and convey additional water.

As stated in Chapter 1, the CALFED ROD identified three goals that could be addressed, in part, through the development of additional surface water storage in the Upper San Joaquin River Basin. These include: contribute to restoration of the San Joaquin River; improve water quality in the San Joaquin River; and facilitate conjunctive water management and water exchanges that improve the quality of water deliveries to urban communities. These goals were used to develop an initial list of problems to be addressed by the Investigation.

During Workshop #2, stakeholders provided input on what actions could be taken to reduce identified problems and to identify opportunities to address other needs in the study area. Through this process, a set of problems and opportunities were identified that have some potential to be addressed by the development of additional surface water storage in the Upper San Joaquin River Basin.

Problems that could be Addressed Through the Development of Additional Storage

- San Joaquin River ecosystem
- San Joaquin River water quality
- Water supply reliability

Opportunities Provided by the Development of Additional Storage

- Flood control
- Hydropower generation
- Recreation
- Delta inflow

The first two problems listed above are similar to objectives stated in the CALFED ROD for storage in the Upper San Joaquin River Basin. Due to the general nature of appraisal-level studies, initial evaluations will not include project-specific details about groundwater recharge projects or water exchanges. Therefore, for the purposes of this Phase 1 Investigation, the ability to address the CALFED goals of facilitating conjunctive water management and water exchanges will be accomplished –through an evaluation of water supply reliability. This refinement in problem definition recognizes the historical and on-going water supply problems in the area served by Friant Dam, made evident by long-term groundwater overdraft.

The above list also includes opportunities to address other regional needs that were not explicitly identified in the ROD but could be addressed through the development of additional storage. For example, the ROD did not specifically recommend that flood problems in the San Joaquin River Basin be reduced, although it did recognize the complimentary relationships between ecosystem restoration, water supply reliability, and flood damage reduction actions. In addition, the development of a surface water storage site

may create opportunities for the development of hydropower generation and recreation facilities. It is also recognized that releasing additional water to the San Joaquin River could affect flows in the river as it enters the Delta, affecting both the volume and quality of Delta inflow. On the basis of this understanding, the three problems listed above will be the basis for initial plan formulation, and the opportunities will be evaluated as additional needs that could also be addressed through the development of additional surface water storage. Each of the problems and opportunities is described in more detail in the following sections.

San Joaquin River Ecosystem

The reach of the San Joaquin River from Friant Dam to the confluence with the Merced River does not support a continuous natural riparian ecosystem. Since completion of Friant Dam, most of the water supply in the River has been diverted for agricultural and urban uses with the exceptions of releases to satisfy riparian water rights upstream of Gravelly Ford and flood releases. Consequently, the reach from Gravelly Ford to Mendota Pool is often dry. Flows from the Mendota Pool to Sack Dam contain Delta water for delivery to the San Luis Canal Company and to State and federal refuges. Groundwater seepage is the primary source of flow below Sack Dam prior to the confluence with Salt Slough. The reach from Sack Dam to Bear Creek benefits from managed wetland development, whereas marshes have been drained between Bear Creek and the Merced River. The lack of reliable flows and water quality in the San Joaquin River results in ecosystem conditions that are generally considered unhealthy.

During the past few decades, societal views towards ecosystem health of rivers in the Central Valley and elsewhere in the nation have changed. Today, many people would prefer a sustainable ecosystem along the upper San Joaquin River. This shift in viewpoint is evident in the numerous programs that are addressing ecosystem restoration in the Central Valley and along the San Joaquin River as well as ongoing litigation between a coalition of environmental interests represented by the NRDC, and Reclamation and the FWUA *(NRDC v. Rodgers)*.

For several years, NRDC and FWUA have been discussing various river restoration ideas that could be used as part of a settlement of *NRDC v. Rodgers.* Resolution of *NRDC v. Rodgers* may include some degree of river restoration, including a flow requirement in the San Joaquin River below Friant Dam. To date, the Court has not yet issued a decision regarding flow requirements or restoration objectives in the San Joaquin River downstream of Friant Dam.

The CALFED Ecosystem Restoration Program (ERP) Plan also describes an ecosystem restoration vision for the San Joaquin River from Friant Dam to the Delta. The vision discusses the types of habitat that may be attainable in each river reach, and identifies actions that would contribute to ecosystem restoration and flood damage reduction along the river.

A group of local stakeholders has recently begun development of a restoration plan for the San Joaquin River. This effort is in its initial phases, and objectives for restoration have not yet been established.

A demand on the Friant system for river restoration could be established at some time in the future, although one is not in place today. The Investigation will begin with the assumption that no specific flow is required, but will consider how additional storage could be used to

provide water supplies to support restoration of the San Joaquin River. The Investigation will maintain flexibility so that plan formulation could adjust if a river restoration requirement is established during the course of the Investigation.

San Joaquin River Water Quality

Water quality in various segments of the San Joaquin River has been a problem for several decades due to low flow, and discharges from agricultural areas, wildlife refuges, and municipal and industrial treatment plants. Initial locations of concern for water quality included areas near Stockton and at Vernalis, downstream of the Stanislaus River as the San Joaquin River enters the Delta. Over time, the requirements for water quality in the river have become more stringent, and the number of locations along the river at which specific water quality objectives are identified have increased.

In 1998, the Central Valley Regional Water Quality Control Board (CVRWQCB) adopted a Water Quality Control Plan for the Sacramento River and the San Joaquin River Basin (Basin Plan) as the regulatory reference for meeting the state and federal requirements for water quality control that are consistent with the designated uses of water. The Basin Plan lists existing and potential beneficial uses of the Lower San Joaquin River, including agricultural uses, municipal and industrial uses, recreation, fishery migration and spawning, and wildlife habitat. Specific water quality standards associated with the Lower San Joaquin River apply to boron, molybdenum, selenium, dissolved oxygen, pH, pesticides, and salinity. The Basin Plan is currently under its triennial review process for beneficial use and water quality standard updates.

One of the high priority issues of the review is the regulatory guidance for Total Maximum Daily Load (TMDL) standards at locations along the San Joaquin River. Section 303(d) of the Federal Clean Water Act (Act) requires the identification of water bodies that do not meet, or are not expected to meet, water quality standards, or are considered impaired, and then prioritized in the 303(d) list. The Act further requires the development of a TMDL for each listing.

The current list, approved by the USEPA, is the 1998 303(d) list, in which Mud and Salt Sloughs and the Lower San Joaquin River from Mendota Pool downstream to the Airport Way Bridge near Vernalis were listed as impaired water bodies. The pollutants or stressors include boron, chlorphrifos, DDT, diazinon, electrical conductivity, Group A pesticides,[1] selenium and other unknown toxics. A list of final dates for meeting TMDLs and implementing associated programs is expected to be considered by the CVRWQCB; at this time the dates are generally set at year 2011.[2]

CVRWQCB staff reports on the selenium TMDL and the salt and boron TMDL were completed in August 2001 and January 2002, respectively. The final report on

[1] Group A pesticides include aldrin, dieldrin, chlordance, endrin, heptachlor heptachlor epoxide, hexachlorocyclohexane (including lindane), endosulfan and toxaphene.

[2] A delay of the final dates to year 2015 are proposed in the December 2001 report prepared by the CVRWQCB on the revision of the current 303(d) list. The report is currently under review by the SWRCB.

organophosphorus TMDL is expected in June 2003. A TMDL is also being prepared for dissolved oxygen in the Stockton Deep Water Ship Channel. Allocations are also likely to be conducted for the San Joaquin River between Mendota and Channel Point (the headwater of the Stockton Deep Water Ship Channel) for nutrients, algae, flow, and sediment.

The TMDL for salt and boron identifies load limits that were developed to attain water quality objectives in the San Joaquin River at Vernalis for irrigation and non-irrigation months. The TMDL includes a base load that would be associated with the lowest expected flow for a given month and water year type, as well as a real-time relaxation approach that could be applied when river flows exceed the assumed minimum levels. Implementation of the real-time relaxation criteria would require flow and quality monitoring at additional locations and the development of a coordinated operations plan for discharges from nearly 300,000 acres of irrigated agricultural land.

CRWQCB Resolution No. 5-01-236, regarding control of discharges from irrigated lands (dated September 7, 2001), stipulates that the CVRWQCB will evaluate the available information and make recommendations as to whether to proceed to adopt a new waiver with conditions or to control discharges through a more formal regulatory approach prior to 2003. Through the triennial review process, the CVRWQCB is preparing an amendment to the Basin Plan to further regulate the water quality upstream of Vernalis and in the Deep Water Ship Channel. Major efforts to meet water quality standards in the San Joaquin River will be required as a result of implementation of the TMDL allocation process.

Regulatory trends over the past several decades show that standards generally become more stringent as the understanding of pollutant effects increases and technology advances. The Basin Plan (including TMDL allocation) is subject to future review and revision. Although it is likely that future versions will address more restrictive water quality objectives than the current version, the existing water quality objectives will be used for the Investigation.

Stakeholder input has suggested that water quality in the San Joaquin River could be improved by delivering water stored in Millerton Lake to the San Joaquin River Exchange Contractors or the wildlife refuges that currently receive Delta water from Reclamation. The provision of better quality water to these areas may result over time in higher quality discharge to the San Joaquin River.

Surface Water Supply Reliability

As described in Chapter 2, the Friant Division of the CVP was authorized and is operated to provide surface water supplies to an area that is highly reliant on groundwater. The groundwater basins in the eastern San Joaquin Valley experiences overdraft in most years, i.e., more groundwater is pumped out than is replenished either naturally or artificially. Although water deliveries from Friant Dam help reduce groundwater pumping and contribute to groundwater recharge, the continued general downward trends of groundwater levels indicate that significant water supply reliability problems remain. A continued decline of groundwater levels can lead to an unsustainable situation due to increased pumping costs, the need to deepen or abandonment wells, and potential land subsidence.

Future operations of the Friant Division are anticipated to be similar to existing operations. Water supply reliability in some areas of the Central Valley will continue to be lower than historical levels and future long-term average water deliveries will likely be less than full

contract amounts. The future without project assumptions for the ongoing CALFED studies are based on projected year 2030demand levels, which include anticipated urban growth in the San Joaquin Valley and Southern California.

Additional storage in the Upper San Joaquin River Basin could increase the reliability of surface water deliveries to CVP Friant Division contractors or other regional water users that could receive water through CVP facilities. Delivery of additional surface water could reduce groundwater pumping, or increase groundwater recharge, resulting in greater water supply reliability. Either general action would result in reduced groundwater overdraft conditions regionally, and would provide greater stability in regional water supplies. This improved reliability would increase opportunities for water exchanges with urban water users to improve the quality of urban water supplies.

Additional storage in the Upper San Joaquin River Basin could also allow higher quantities of water to be provided to Mendota Pool via the San Joaquin River if releases are made for ecosystem or water quality purposes. Increased deliveries to Mendota Pool could in turn reduce required deliveries of water to the Mendota Pool via the Delta-Mendota Canal, increasing the water supply reliability to other South-of-Delta water users.

Flood Control

Flood operations at Friant Dam are based on anticipated precipitation and snowmelt runoff and the operations of upstream reservoirs. During flood operations, releases from Friant Dam are maintained when possible at flows that could be safely conveyed through the San Joaquin River and Eastside Bypass. Generally, flood operations target releases at or below 8,000 cfs downstream of Friant Dam.

Major storms during the past two decades have demonstrated that Friant Dam, among many other dams in the Central Valley, may not provide the level of flood protection that was intended at the time the flood management system was designed. In January 1997, uncontrolled releases from Friant Dam resulted in levee failures and extensive flooding in downstream areas.

Recent preliminary evaluations by the U.S. Army Corps of Engineers (COE) suggest that Friant Dam could regulate larger storm events at non-damaging flows if the flood storage capacity in Millerton Lake or elsewhere in the Upper San Joaquin River Basin were enlarged. The development of new surface water storage capacity for water supply and other purposes would provide an opportunity to capture additional flood volume at times when the water supply storage space is vacated. During initial studies for this Investigation, changes in flood storage rules will not be considered. Rather, the effects of enlarged storage on flood protection using existing flood control space requirements will be identified. The results from this evaluation will help identify the extent to which flood control is considered in future studies.

Hydropower

Hydropower has long been an important element of California's power supply. Because of the ability to rapidly increase and decrease power generation rates, hydropower has often been used to support peak power loads in addition to base power loads. As reservoir operations have changed during the past two decades to accommodate environmental and

changing water demands, California's ability to rely on hydropower for meeting peak demands has reduced.

Recent power supply problems in California suggest that there is a shortage of peak electricity production capacity. As population increases and economic development continues, electricity demands are expected to increase. Although some new power generation capacity will likely come on-line in the future, it is reasonable to expect that that additional generation capacity will still be required.

The development of additional storage in the Upper San Joaquin River watershed could provide opportunities to increase hydroelectric energy production capacity. Increasing the height of Friant Dam, or the construction of other dams, would provide additional head for hydropower generation and in some cases create opportunities for pump-storage operations. Although the economic feasibility of hydropower-only projects may be limited, the development of new storage for water supply, water quality, and ecosystem restoration creates opportunities for the addition of hydropower features. A net increase in hydropower generation capacity would help address current and anticipated future problems in meeting peak and base loads.

Recreation

Demands for water-oriented recreational opportunities in the San Joaquin River Basin are high. Some of these demands are served by reservoirs on the eastern slope of the Sierra Nevada Mountains. As population increases in the San Joaquin Valley, recreational demands are expected to increase.

Additional storage in the Upper San Joaquin River watershed could provide opportunities to increase water-oriented recreation facilities, such as swimming, access points for various types of boating, and trail use. In addition, the release of water from Friant Dam to the San Joaquin River for ecosystem restoration or water quality objectives could also increase recreation opportunities along the river.

Opportunities to increase recreation will depend upon site-specific conditions at potential or existing reservoirs as well as river flows associated with operational scenarios. Specific recreational features that would be consistent with storage alternatives will be identified later in the planning process.

Delta Inflows

The San Joaquin River terminates at the Sacramento-San Joaquin Delta, through which most of California's surface water passes. Many competing demands are placed on the water that flows into the Delta, including water supplies for CVP and SWP users, water supplies for in-Delta and Bay Area users, and flows for ecological function and water quality in the Bay-Delta estuary. From the perspective of many Delta-dependent interests, available annual and seasonal flows are below desired levels.

The primary goals of the CALFED program are to improve ecosystem conditions in the Bay-Delta and water supplies in California. Several actions are needed to accomplish these goals, including increasing Delta inflow. Additional storage in the Upper San Joaquin River watershed could lead to increased magnitude, duration, or frequency of inflows to the Delta

resulting from releases intended to improve the San Joaquin River ecosystem or water quality.

The frequency and magnitude of flows released from Friant Dam that would reach the Delta depends on assumptions regarding the use of the water at Mendota Pool and seepage to groundwater. Because of these uncertainties, new storage in the Upper San Joaquin River Basin would not likely be operated specifically to meet Delta flow and water quality objectives, but water released for other purposes, such as water quality or river restoration, could provide benefits to the Delta.

The Investigation will estimate potential Delta inflow effects by comparing changes in San Joaquin River flows at Vernalis. It is assumed that the Vernalis Adaptive Management Plan (VAMP) will continue into the future and that existing reservoirs in the San Joaquin River Basin will be operated in accordance with existing criteria. Increased flow at Vernalis could change conditions in the Delta resulting in both potential ecosystem and ancillary water supply reliability benefits. Potential ecosystem benefits include increased flow and water quality in South Delta channels. Ancillary water supply benefits include the potential for increased Delta exports and export reliability, improved Delta export water quality, and a reduction in water releases by other entities and streams to meet VAMP requirements.

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